tioned as ready for issue in the last Report, were distributed in 1885. Mr. Pogson's attention was chiefly directed, during the year, to the necessary preliminary investigations for the publication of the meridian-circle observations from 1862 to the present time. The formation of the star ledgers and the deduced catalogues of mean positions for each year were completed for the years 1862, 1863, and partly for 1864, which will form the first of the eight volumes about to be published. The star ledgers for the next three years—1865-67—are also in progress, for the second volume of the series. Except for time observations and determinations of positions of a few comparison stars for equatorial observations, the meridian-circle will be little used until the publication of its past results is accomplished. Only 352 complete positions of stars were determined in 1885, making 52,074 during the past twenty-four years. A few observations of minor planets were made with the equatorials during the year. We are glad to find that there is at length a prospect of the publication of the Madras meridian observations, the long delay in which has been a serious blot on the fair fame of the Observatory.

ASTRONOMICAL PHENOMENA FOR THE WEEK 1887 *JANUARY* 23-29

(FOR the reckoning of time the civil day, commencing at Greenwich mean midnight, counting the hours on to 24, is here employed.)

At Greenwich on January 23

Sun rises, 7h. 54m. ; souths, 12h. 12m. 4·4s. ; sets, 16h. 30m. ; decl. on meridian, 19° 27′ S. : Sidereal Time at Sunset, 0h. 41m.

Moon (New, January 24) rises, 7h. 14m. ; souths, 11h. 40m. ; sets, 16h. 9m. ; decl. on meridian, 18° 13′ S.

Planet	Rises	Souths	Sets	Decl. on meridian
	h. m.	h. m.	h. m.	° ′
Mercury	7 38	11 34	15 30	23 0 S.
Venus	8 34	13 4	17 34	17 34 S.
Mars	8 49	13 36	18 23	14 36 S.
Jupiter	1 0	6 2	11 4	11 54 S.
Saturn	14 59	23 6	7 13*	22 6 N.

* Indicates that the setting is that of the following morning.

Occultations of Stars by the Moon (visible at Greenwich)

Jan.	Star	Mag.	Disap.	Reap.	Corresponding angles from vertex to right for inverted image
			h. m.	h. m.	° °
28	4 Ceti	6	19 16	20 13	179 296
28	5 Ceti	6	19 42	20 26	196 281

Variable Stars

Star	R.A.	Decl.			
	h. m.	° ′		h. m.	
U Cephei	0 52·3	81 16 N.	Jan. 26,	22 21	*m*
λ Tauri	3 54·4	12 10 N.	,, 24,	20 33	*m*
			,, 28,	19 25	*m*
ζ Geminorum	6 57·4	20 44 N.	,, 29,	0 0	*m*
S Cancri	8 37·5	19 26 N.	,, 24,	0 55	*m*
R Virginis	12 32·8	7 37 N.	,, 26,		*M*
V Virginis	13 22·0	2 35 S.	,, 23,		*M*
δ Libræ	14 54·9	8 4 S.	,, 24,	18 23	*m*
			,, 27,	2 15	*m*
U Coronæ	15 13·6	32 4 N.	,, 27,	19 21	*m*
U Ophiuchi	17 10·8	1 20 N.	,, 25,	3 30	*m*
			and at intervals of	20 8	
R Scuti	18 41·4	5 50 S.	Jan. 27,		*m*
β Lyræ	18 45·9	33 14 N.	,, 26,	3 0	*M*
δ Cephei	22 25·0	57 50 N.	,, 28,	1 0	*m*

M signifies maximum ; *m* minimum.

Meteor-Showers

On January 28 a radiant near δ Coronæ Borealis is in evidence. The meteors from this radiant are very swift, R.A. 236°, Decl. 25° N. Another radiant giving very swift meteors lies near σ Leonis, R.A. 168°, Decl. 7° N.

GEOGRAPHICAL NOTES

IT is all but certain that Mr. Stanley will lead the Emin Pasha Relief Exploration by the Congo route. He will certainly go to Zanzibar, prepared to follow whatever route circumstances may indicate as likely to prove the most successful. At Port Said he will meet with Dr. Junker, who may give him information of critical importance. At all events, Mr. Stanley and his staff and the whole of the baggage will proceed, in the first instance, to Zanzibar. If a steamer is handy, the Expedition, after recruiting a caravan and laying in a store of suitable goods for trade by the way, will sail round the Cape to the Congo ; that at least is Mr. Stanley's present intention. All the available steamers belonging to the King of the Belgians will be placed at his disposal, and probably by the beginning of May he will be at the limit of navigation and ready for his land journey eastwards to Lake Albert Nyanza ; if, indeed, he does not give the lake a wide berth westwards and go direct to Wadelai. A camp as a base of operations will be established, as far as safe from the Congo, and left in charge of a trustworthy member of the staff. About fifty donkeys will be taken to carry the heavy baggage, and the caravan will consist of about 100 men, with a few Egyptian soldiers to maintain discipline. The staff consists of half-a-dozen carefully selected men, among whom are two able engineer officers, under whose care the interests of science will be attended to. Four or five carefully rated chronometers and other instruments are being taken, so that we may expect some good results. It is probable that Mr. Stanley will endeavour to solve the Albert Nyanza and the Wellé-Mobangi problem, as well as other obscure points in African hydrography, on his return journey. It is to be hoped that Emin Pasha will not think of coming away, as Dr. Junker states he wishes to do ; but if he does, then no doubt Mr. Stanley will be able to make arrangements to carry on the work which Emin has begun so well. Mr. Stanley leaves England to-morrow, and the good wishes of all will go with him. He is confident of being able to reach Emin Pasha by July 1, and possibly may be back in Europe about Christmas ; in that case, we fear, he could not do much exploring work.

DR. LENZ has at last arrived at Zanzibar, having taken less than eighteen months to cross the African continent from the mouth of the Congo. A fortnight ago we gave some account of his journey up the Congo from Stanley Falls to Nyangwe and Kasonge ; it will be interesting to know what route he followed after leaving the Upper Congo. It will be remembered that Dr. Lenz went out eighteen months ago for the purpose, if possible, of reaching Emin Pasha and Dr. Junker. From Zanzibar the late Dr. Fischer started through Masai Land on a similar errand. In both cases the object has not been accomplished, and no wonder, now that we know the real facts. Much good work, however, has been done by both men. Dr. Lenz is a man of scientific training and experience in African travelling, and there can be no doubt that the results of his just completed journey will be a gain to science. It is possible that Mr. Stanley may meet with Dr. Lenz on his way to Zanzibar ; and if so may obtain some information that will be of service on his great expedition.

THE Rev. Thomas Brydges, a missionary in Tierra del Fuego, in the large island of Onisin, among the Ona and the Yagbons, mentions a curious circumstance with reference to the people, illustrating the influence of environment on the acquirement of habits. Between men and women there is a fair subdivision of labour. Among other things, the men make and fit up the canoes, but the women are the rowers. The result is that the women are good swimmers, but the men cannot swim at all. The reason is that often on the coast there is not a single tree to which to fasten the canoes. The women, therefore, after landing their husbands, have to row the canoes to a spot where sea-weed has been massed together, in order to moor the canoes thereon ; after which operation they are compelled to swim back. So, also, when the canoe is wanted, the woman has to swim out for it and row back for her husband.

THE current number of the *Mittheilungen* of the Geographical Society of Vienna (Band xxix. No. 10) has a large map of the route from Ango-Ango to Leopoldville, made by Herr Baumann, of the Austrian Congo Expedition, with accompanying remarks, and a comparison with other recent maps of the same part of the river. There is an interesting note by Herr Baumann on the numerical systems of the Why or Wai Negroes and of the Mandingoes. The former, although they have a writing of their own—the Mandingoes use Arab letters—have no expression in their language for 100, and use the English, while the Mandingoes, Bantus, and other tribes can count with ease up to 1000. Herr Baumann also writes on the region around Stanley Falls,

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and its inhabitants. The two remaining papers are mainly geological, one being on the geography of Persia, by Dr. Tietze, the other the conclusion of Dr. Diener's paper on the hypsometry of Central Syria.

EXPERIMENTAL SCIENCE IN SCHOOLS AND UNIVERSITIES

PROF. G. F. FITZGERALD, as Vice-President of the Dublin University Experimental Science Association, delivered an address at the opening meeting, held on November 23 in the Museum Buildings of Trinity College, under the presidency of the Rev. the Provost, on "Experimental Science in Schools and Universities."

Prof. Fitzgerald, at the outset of his address, dealt with the history of Universities, and showed how they gave such preponderance to book as against experimental knowledge. That had led, the Professor continued, to a dual system of education—the professional and the commercial. That gap between the classes was much to be lamented, and necessitated, from a political point of view, the desirability of having all classes educated in the same institutions. The commercial classes would not, however, enter the Universities at present, because they required to be taught useful subjects, and they would not learn the Latin and Greek now required in our Universities. From the political side of the question, he thought, they had got these results—that they must be content to have useful subjects taught in their schools and Universities if the schools and Universities were to be used by the large body in the country who were willing and able to pay for it. What they must have, if possible, was a single school and college system for all classes of the community who were able to spend the first twenty years or so of their life in education, and they ought to have a system that was complete, a training which gave both those who could not afford to go on the whole length up to twenty years, and which ought to be able to train those who desired to go on for the higher culture. Returning to the education side of the question, he insisted that almost the whole importance was as to how the subject was taught. He thought the use of the Latin Grammar had been reduced to a very good system, but he thought it was perfectly evident from the course that things were taking and the reasonableness of things, that they must teach their youth some knowledge of science. People who felt responsibility in the matter were being more and more convinced that it was not right for them to allow their children to grow up ignorant of the laws of the world in which they live. Others made answer to that that they left those laws of the world to the doctors. But how were they to know under what circumstances it was well to consult a specialist? It was very necessary for us to have a knowledge when we required to consult a doctor. Hundreds of people were killed by ignorance of the fact that dirt was the cause of disease. That was a very elementary subject. Nevertheless, people were dying every day from ignorance of that very fact; and, unless they were taught to believe in the fact that there were laws of Nature, they would not believe that dirt was the cause of disease, because they saw some people living in dirt and yet not the victims of disease. He thought that time for teaching science must be found for these two reasons—it was necessary that our youth should learn the laws of the world in which they live, and that they also should learn how to discover those laws. Unless our people were taught the laws under which plants and animals were best grown, the people of other countries would rival them in the manufacture of butter and beef, and the result would be that our people must starve. Another advantage of such training was to prevent superstition such as that of the people of Spain, who preferred the use of charms as a safeguard against cholera to the cleansing of their wells. All the classes of the country required this training—they would die without it, so they must have it.

Having shown that the cultivation of Latin and Greek was originally with the view of acquiring the information contained in the ancient books in those languages, the Professor combated the five reasons formulated by the German professoriate as to why they thought that the cultivation of Latin and Greek was so important, observing, with regard to the fourth reason—that these languages were the best varied exercise in thinking—that if the connection between words and ideas was a thing that must be taught in every system of education, his impression was that that would be a great deal better attained by describing accurately and thinking out the consequences of physical experiment. In choosing the sciences that they should teach, there were three conditions that should be fulfilled. First of all, the sciences chosen ought to be within the grasp of children, because it was highly important that the science begun with childhood should be continued on in the University days; secondly, it ought not to require any expensive apparatus, because schools and people who trained children could not be expected to buy elaborate apparatus, and children could not be expected to work with them satisfactorily; and, thirdly, he thought the sciences should be chosen so as to be concerned with a large number of the laws of the world in which we live. There were two large branches of science which included nearly all the laws of the world, namely, the physical and the biological; and, therefore, he thought it would be desirable to choose two sciences—one on the physical and one on the biological side, so that children might learn something about the laws of living things, and something about the laws of physical things. He therefore suggested chemistry and botany, and he thought the whole weight of their efforts should be devoted to trying to get the children in schools to learn the elements of chemistry and the elements of botany, for there were no other two sciences the elements of which were almost similar, and at the same time there were no other two sciences that led up to a greater number of the laws of life, nor that gave a wider and more extended view of the laws of the world in which we live. The objections to the present system of teaching a knowledge of experimental science was that it almost entirely concentrated the person's attention upon phenomena instead of upon reasoning. Therefore, in choosing their system of teaching, all their weight ought to be thrown into making sure that their plan had the effect of making the child learn to think a good deal. Another thing they had to consider was the enormous time that children were made to remain in school without being engaged in anything except mischief. He thought a child should not spend more than four hours a day at literary work. Well, that occupied but a small part of a child's day; and one of the great advantages of having experimental subjects introduced into school teaching would be that they were subjects at which a child could work without experiencing very much fatigue. He could not help calling attention to the flagrant abuse of the teaching of experimental science in Irish schools. Experimental science in Irish schools was very nearly the same as snakes in Iceland. Having pointed out the fallacy of an examination—as exemplified in the Intermediate Education system—that was satisfied with a reading of the musical signs unwedded to a knowledge of the sounds they represented, the Professor said it would be an enormous advantage if the Intermediate Commissioners could be induced to keep up a peripatetic system of periodical examinations that would insist upon practical knowledge. That, however, should not interfere with the giving of papers also. After observing that it was at the present time impossible to carry out a proper examination in laboratory work, and stating that he considered it would be very desirable that the actual work in the laboratory and analyses in practical subjects should count towards the University prizes, Mr. Fitzgerald said he considered that the present system of analysis was not very satisfactory, and he urged the introduction of a system that would teach chemistry practically. Though that might be harder to teach than Latin and Greek, it would not be so if they had a system worked out and teachers to promote it, and it would have the inestimable advantage that, in addition to training the child to think—which he thought it would do equally well with Latin and Greek—it would teach him the laws of things, and how to see and learn the laws of things. It would also teach the child to use language to express real ideas, and not merely phrases. They would also learn a good deal more of the laws of language from a modern language that they learned with the grain than they would by learning an ancient language against the grain. He thought that literature and history were co-ordinate with science, and they certainly ought to be a large part of education. Literature and history were grievously neglected in the present day—practically they had no place, and that was substantially because Latin and Greek were supposed to be a literary education. One of the reasons was that those subjects were hard to examine in, but there was an easy way out of that difficulty in Universities. They need not examine, but they could require attendance at lectures—attendance on good lecturers; and the student would pick up more

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